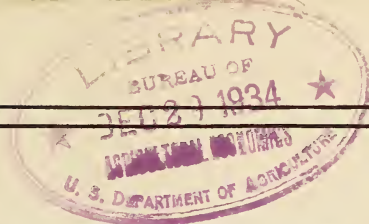


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CONTROLLING KIDNEY WORMS IN SWINE IN THE SOUTHERN STATES

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The kidney worm of swine is one of the most serious obstacles to profitable swine production in the South. Since these parasites are located in the liver, kidney fat, kidney tissue proper, blood vessels, and other parts of the body outside the digestive system, they cannot be removed by any known medicinal treatment. The only hopeful outlook for the control of these parasites is a system of management designed to protect hogs from the infective larvae of the worms. These larvae develop from eggs eliminated with the urine of infected hogs. (Fig. 1.) Larvae of the kidney worm are prevalent on hog pastures in practically all the Southern States.

Life History of Kidney Worms

Heavily infested swine eliminate thousands of kidney-worm eggs daily with the urine. The eggs, which can be seen only with a microscope, develop on pastures, in hog lots, in barns, near fences, along the sides of buildings, in fact, in any location which affords moisture and shade. Under the most favorable conditions during the warm months, the eggs hatch in about 24 hours after they have been deposited on the ground with the urine. When cool weather prevails, during the early spring and late fall months, the period required for hatching may be prolonged to 2 or more days. At a temperature of about 50° F. the development of the eggs becomes arrested, and a continuous exposure of the eggs to such temperature for 10 days may destroy life in them. Freezing temperatures destroy life in kidney-worm eggs in about 24 hours. The summer months and the warm spring and fall months are, therefore, most favorable to the propagation of kidney worms, and during these periods the larvae which emerge from the eggs develop to the infective stage in from 4 to 6 days after hatching.

Swine become infested with kidney worms by swallowing the infective larvae with forage or dry feed that has become contaminated with them, and by rooting and hunting for feed in litter which is allowed to accumulate on pastures and in lots. Kidney-worm larvae can enter the bodies of swine through the skin also, especially when it has been broken by rubbing or scratching or has been injured by fleas, lice, mange mites, or ticks, or in some other way. Regardless of the way in which the larvae enter the body, they get into the blood and are carried to the liver, lungs, and other organs. The liver is their preferred location during the early stages of their life in swine.

The worms make their way to the surface of the liver and thus get into the abdominal cavity.

At this stage the worms are from about one-third to one-half grown. Their wandering in the body cavity brings them to various other parts of the body including the loin muscles, in which they frequently become embedded. Those worms which get into the kidney fat, however, are the ones that produce the eggs that are eliminated with the urine. In the kidney fat the worms hollow out tunnels which lead to the ureters, two slender tubes connecting the kidneys with the bladder. They also puncture the ureters, thus

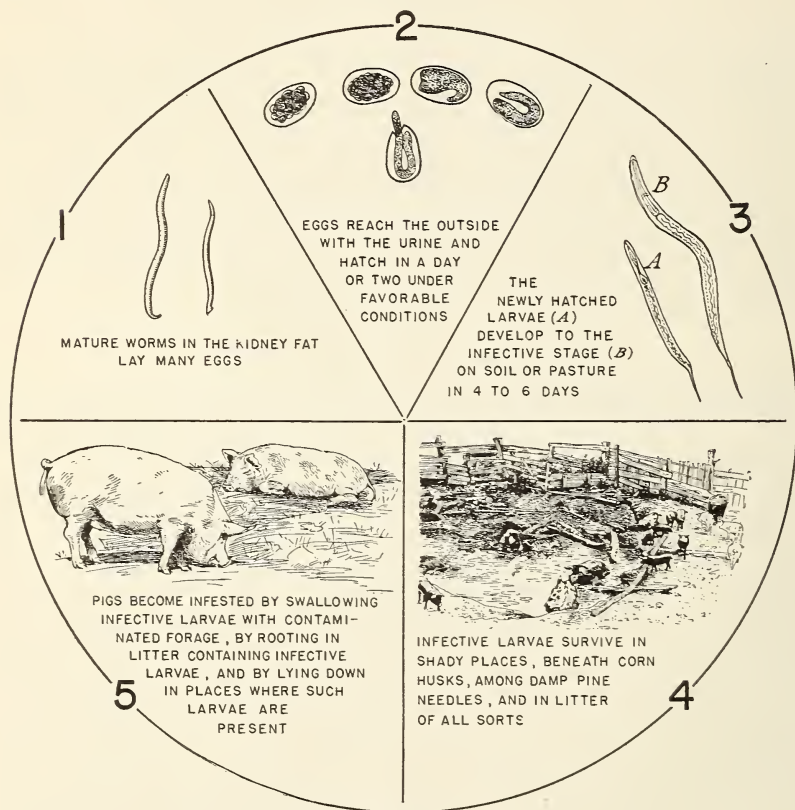


FIGURE 1.—Life history of the swine kidney worm.

providing an avenue for the escape of the eggs to the bladder. Some of the kidney worms bore into the kidneys, and this procedure also affords an outlet for the eggs to the bladder. When an infested hog urinates, it discharges the kidney-worm eggs which have accumulated there. The time required for kidney worms to develop to egg-laying maturity in swine is about 6 months.

Special Management as a Control Measure

Investigations conducted by scientists of the Bureau of Animal Industry and of foreign countries have brought to light facts which

have a practical bearing on kidney-worm control. These investigations have shown that kidney-worm larvae are abundant in shady areas, along fences, and elsewhere in hog pastures where there are moisture and shade. Eggs and larvae exposed experimentally on dry soil perish quickly from the effects of drying, heat, exposure to sunlight, and possibly from other natural factors. On the basis of these facts, investigators of the Bureau of Animal Industry devised a system of management for sows and their litters and tested it in cooperation with hog growers in the vicinity of Moultrie, Ga. This plan, which is especially adapted to southern conditions, is based on a special arrangement of the feed lot and pasture, as shown in figure 2.

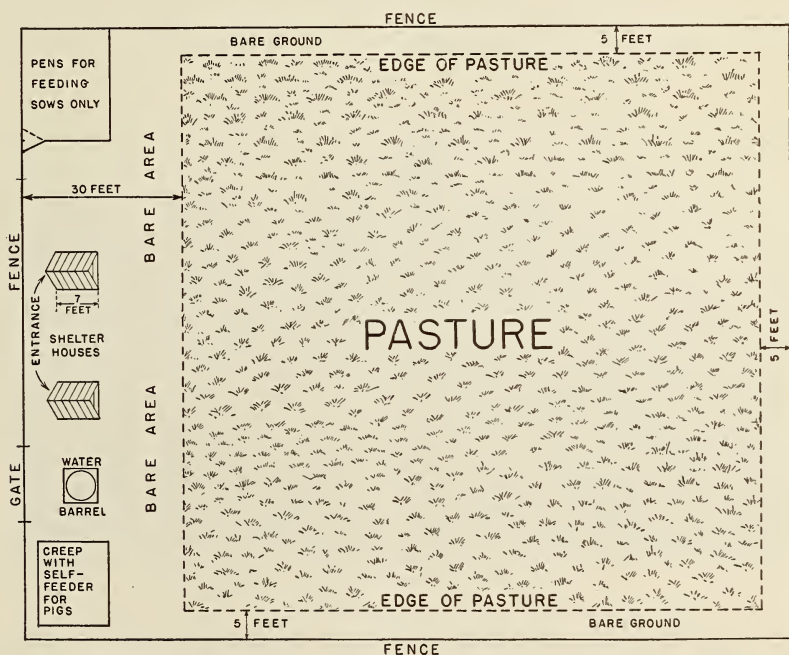


FIGURE 2.—Plan of hog pasture with special arrangement for feeding sows and young pigs so as to prevent infestation of young pigs with kidney worms.

The system of management consists chiefly in protecting the pigs from becoming infested while they are with the sows. After the pigs are weaned they can be protected readily by being kept on temporary pastures especially prepared for them, and away from the sows and all other swine except pigs from other litters of about the same age which have also been raised under the special system. Provision for affording protection to the pigs during the suckling period can be made by placing pregnant sows, shortly before they farrow, on a pasture which has been specially prepared by being sown to a suitable forage crop. There is a bare area, all around the pasture, about 5 feet wide on three sides and about 30 feet wide at one end. A strict adherence to these dimensions is not absolutely essential. The important point to remember is the need for provid-

ing a bare strip all around the field, and at one end an area more than sufficiently wide to accommodate the shelter houses, water barrel, creep for the pigs, and feeding pen for the sows.

Although some effort is required to provide a bare strip on three sides of the pasture in addition to the relatively wide bare area at one end, the good that is accomplished far outweighs the labor involved. However, when a large pasture is used for the sows and pigs, and the narrow, bare strip cannot be provided because of the labor involved or for some other reason, the control plan will still be effective if a bare area not less than 30 feet wide is provided at one end of the pasture. In this case the bare area should be partly extended along each side of the pasture for a distance of about 30 feet as two bare strips, each about 5 feet wide. The creep should be large enough to enable all the pigs to feed comfortably. The bare portion of the field should be free from trash and litter; otherwise the purpose of the plan will be defeated. In many of the control procedures which have been carried out thus far, the creep with a self-feeder for the pigs was located on the pasture. This has certain disadvantages, however, among which are the following:

The sows often remain close to the creep while the pigs are eating. During this time the sows may urinate and defecate. This results in a pollution of the pasture with eggs of worm parasites passed with the urine and the droppings of the sows. Furthermore, infective material from the pasture may be carried on the shoes of the person who walks across the grazing area to the creep in order to replenish the feed. By locating the creep and self-feeder for pigs on the bare area these sources of infection can be avoided.

The entire arrangement, as shown in figure 2, accomplishes the following results which aid in kidney-worm control: The sows usually urinate not far from their shelters, especially after waking up. They also tend to urinate near the fences and, as already stated, near the creep while the pigs are eating. Since these areas are bare, and usually dry, except during wet seasons, the kidney-worm eggs, eliminated with the urine, will be deposited where they will perish from exposure to sunlight, heat, and drying (fig. 3). The larvae of these parasites also are easily destroyed by these agencies. Although sows will urinate on the pasture also, and thus disseminate the parasites, a large proportion of the potential infective material is destroyed as mentioned previously.

Feeding Sows Separately

By providing a separate pen for feeding the sows and, some distance away, a creep for the pigs, considerable good is accomplished in controlling other parasites as well as kidney worms. The gate of the sows' feeding pen should be kept closed at all times in order to prevent the pigs from entering the pen. The gate is opened only to admit the sows and to drive them out after feeding. The sows tend to urinate and defecate shortly after feeding. Kidney-worm eggs passed with the urine and eggs of other worm parasites passed with the manure are thus deposited in a place inaccessible to the pigs and will perish sooner or later. The manure from the feeding pen

and from the bare area should be removed at frequent intervals, thereby eliminating this source of parasite infestation.

The arrangement shown in figure 2 has been designed to provide, as far as possible under actual farm conditions, effective natural barriers to the development of kidney-worm larvae. That this arrangement is not only practical but also an effective control measure is shown by the following facts.

Value of System as Shown by Post-Mortem Results

A careful post-mortem examination of 125 pigs, raised on farms in southern Georgia under the special plan, showed slight kidney-worm lesions in the kidneys of only 4 percent of the animals; only about 15 percent of the livers were condemned as unfit for food because of kidney-worm infestation. A litter of pigs raised under this plan is shown in figure 4. In another series of post-mortem examinations,



FIGURE 3.—Sows and pigs on bare area of hog lot designed to control kidney worms. Note A-type shelter houses and pasture.

involving 291 pigs raised with due attention to sanitation but not under the special plan, approximately 23 percent of the animals had worm lesions in the kidneys, and about 68 percent of the livers were condemned as unfit for food because of kidney-worm infestation. In a third series, involving 28 pigs raised without regard to sanitation, 32 percent of the animals showed kidney-worm lesions in the kidneys, and more than 97 percent of the livers were condemned because of these lesions.

Observations of the different lots of pigs showed that the litters raised under the special plan were uniform in size and were generally more thrifty than litters raised with no attention to sanitation (fig. 4).

These figures demonstrate conclusively the importance of following the precautionary measures devised for the control of kidney worms. Aside from causing losses under meat-inspection procedures, kidney-worm infestation retards the growth of pigs, paves the way

for bacterial infection, and is largely responsible for the death and unthriftiness of young pigs on farms throughout the South. Raising parasites along with livestock is a source of loss for the stockman.

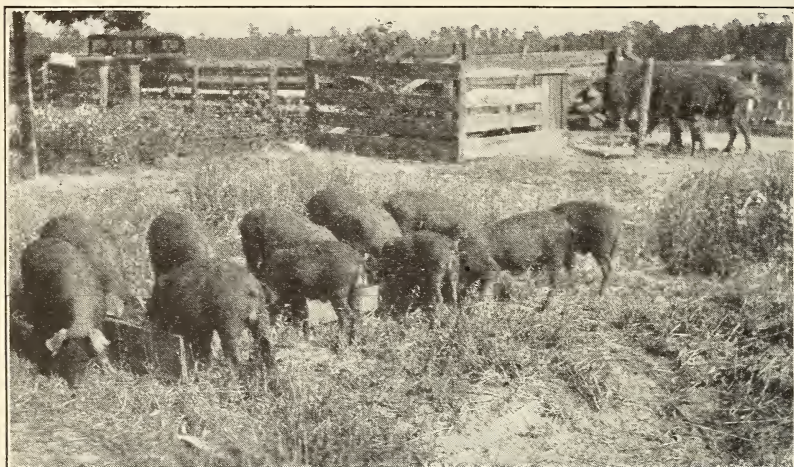


FIGURE 4.—A litter of pigs raised under the special plan for kidney-worm control. Note the uniform size and general thriftiness of the pigs.

By the exercise of precautions for the control of disease the stockman can more accurately adjust his volume of production to the demands of the home and foreign markets.